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NOMENCLATORIAL NOTES CONCERNING JUNIPERUS

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THE nomenclature for the calciphilous juniper from the Edwards Plateau of central Texas is considerably confused. It has long been referred to in the manuals as *Juniperus mexicana* Sprengel. The name *Juniperus Ashei* Buchholz is now in fairly common use for the Texas species, and it is my purpose to show why it may continue to be used and why *Juniperus mexicana* Spreng. and other names may not.

Early collectors had the idea that this Texas calciphile represents the northernmost distribution of a juniper from the mountains of central Mexico. American authors have consistently referred this juniper to Sprengel's species described in 1826 on page 909 in volume 3 of Linné Systema Vegetabilium as:

“*mexicana** 20. J. arborea, foliis arctissime 4fariam
imbricatis 3angulari-ovatis obtusis crassis.
Mexico. (Cupressus sabinoides Kunth.)”

Sprengel's species, based on *Cupressus sabinoides* HBK,¹ refers to a juniper of high altitudes in central Mexico which resembles the Texas juniper somewhat in habit but is otherwise very different. At that time Sprengel was justified in naming his transferred species *mexicana*, since there were no rules. However, after the establishment of the International Rules of Botanical Nomenclature, it would have been necessary (in lieu of Art. 54 of the rules) for subsequent authors to re-establish the

¹ HUMBOLDT, BONPLAND, AND KUNTH. Nova Gen. et Sp. Plant. ii: 3, 1817.

name *sabinoides* for Sprengel's species, *Juniperus mexicana*, which, by these retroactive rules of nomenclature, was superfluous when created and thereby illegitimate. If Sprengel could have looked ahead, he might have transferred HBK's specific name to *Juniperus* and avoided creating a name destined to become illegitimate. When Martínez² examined the problem in 1946 and determined which juniper Sprengel and Kunth were describing, he had to find a new name because both *sabinoides* and *mexicana* were by then homonyms.³ Martínez decided that Sprengel's and HBK's names applied to a juniper which he considered to be a form of another species. He had to apply a new name to his species, too, since the only existing one, *Juniperus tetragona* Schl.⁴ (1838), was a homonym (of *Juniperus tetragona* Moench,⁵ 1794). Thus, in 1946 Martínez named the Mexican species *Juniperus monticola* and created two forms within it. One of these forms, *Juniperus monticola* Martínez forma *compacta* Martínez is the element to which he referred *Juniperus mexicana* Spreng. and *Cupressus sabinoides* HBK.

Both the Texas calciphile (*J. Ashei* Buchholz) and *J. monticola* Mart. are in the Sabina section and have their affinities with the xerophytic junipers which have toothed leaf margins and branching to the seventh degree. While these two species are superficially similar (e.g., in habit, fruit color, size, and odor), they are very different when these characters are studied carefully and in their proper relation to other characters. On morphological evidence the Texas calciphile is closely related to *J. monosperma* (Engelm.) Sarg. and its close relatives *J. occidentalis* Hook., *J. Pinchoti* Sudw., *J. californica* (Carr.) Antoine, *J. erythrocarpa* Cory and varies in the direction of the *J. deppeana* Steud. group. It is not close to *J. monticola* Mart. or *J. monticola* forma *compacta* Mart. (*J. mexicana* Spreng.) to which it has been assigned by American authors. The chief differences

² MARTÍNEZ, M. *Los Juniperos Mexicanos*. *Anales Del Instituto de Biología* 17: 3-128. 1946.

³ GRISEBACH, A. H. R. *Spicil. Fl. Rumel.* ii: 352. 1844. Grisebach had given the name *Juniperus sabinoides* to another species in 1844. Grisebach's name applies to *J. foetidissima* Willd. Schlechtendal had given the name *J. mexicana* to another species in 1830. The modern interpretation requires the epithets *sabinoides* and *mexicana* to become homonyms based on Article 73 of the International Code of Botanical Nomenclature in lieu of the retroactive nature of these rules.

⁴ SCHLECHTENDAL, D. F. L. *Linnaea* XII. 495-496. 1838.

⁵ MOENCH, C. *Meth. Pl.* 699. 1794. (= *J. phoenicea* L.)

between *J. Ashei* and *J. monticola* are listed in Table 1 and illustrated in Plate 1.

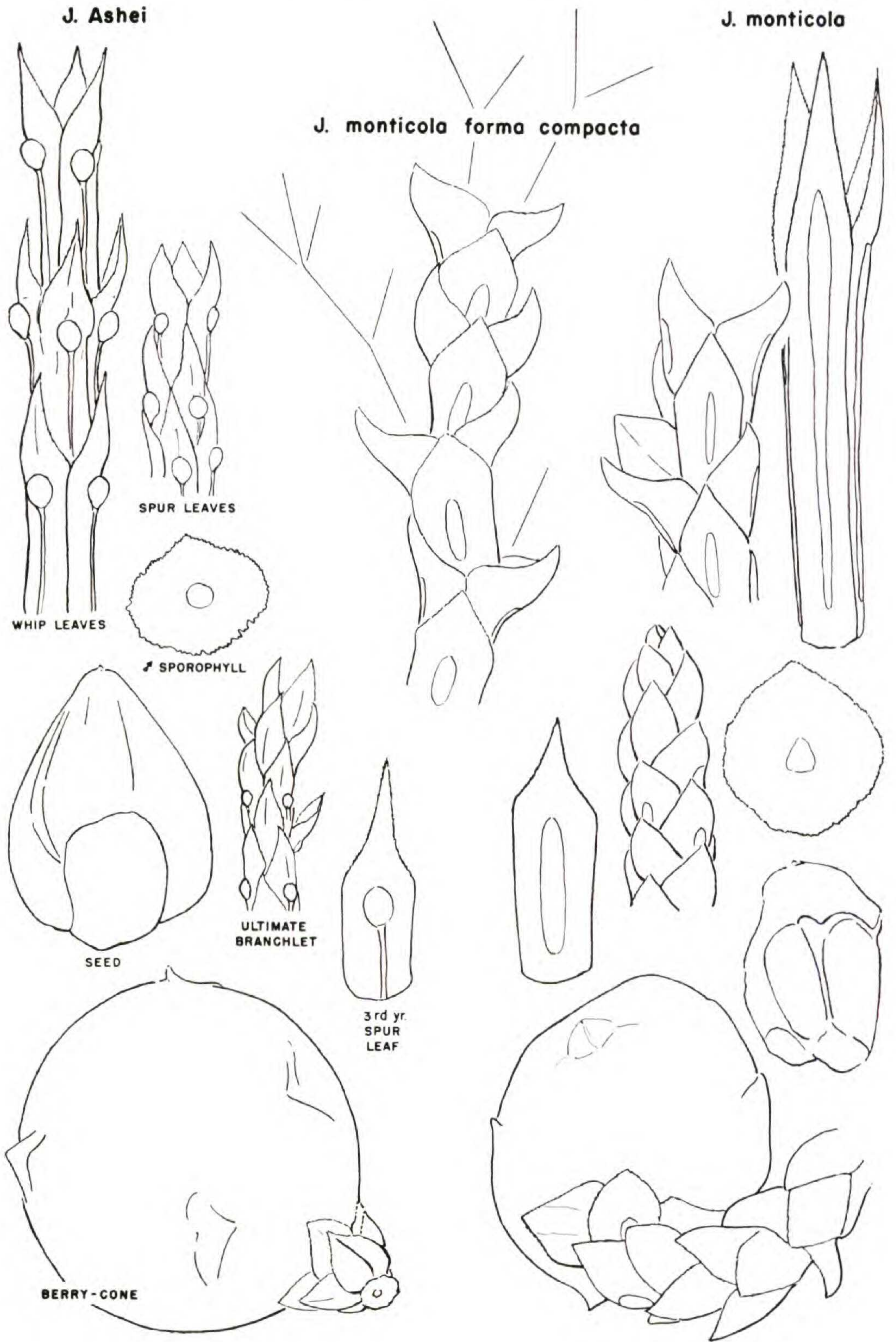
TABLE 1. COMPARATIVE GROSS MORPHOLOGY OF
J. ASHEI AND *J. MONTICOLA*.

<i>Juniperus Ashei</i>	<i>Juniperus monticola</i>
1. Trunk branched near the base; angle of branching wide; aspect bush-like; height to 35 feet.	1. Trunk branched near the base, branches twisted; angle of branching acute; aspect like a dwarf tree; height to 25 feet (usually less than 3 feet in forma <i>compacta</i>).
2. Foliage dense; mostly ternate, even on ultimate branchlets.	2. Foliage more dense; mostly decussate (densest in forma <i>compacta</i> where branching occurs typically from the axil of every other leaf in the same plane giving a fan-like, blunt aspect to the foliage).
3. Foliage yellow-green. Young woody twigs bright rust-brown aging to ash-gray.	3. Foliage blue-green. Young woody twigs tawny-red with a violet blush.
4. Whip leaves average 7 mm. long with a circular raised gland (about $\frac{1}{2}$ mm. in diameter), and a keel extending from the gland to the base of the sheath.	4. Whip leaves average 10 mm. long with a long narrow sunken gland most of its length, no keel.
5. Spur leaves $1\frac{1}{2}$ to 2 mm. long with round gland or frequently eglandular.	5. Spur leaves slightly larger with long narrow gland, elongate-elliptic, rarely eglandular.
6. Fruit large (6–8 mm. in diameter), aromatic, azure-blue, slightly bloomy, with slightly resinous juicy pulp, which is black when fresh and rust-brown when dry, fruiting branchlets straight.	6. Fruit slightly larger (7–9 mm. in diameter), aromatic, azure-blue, slightly bloomy, with slightly resinous juicy pulp which is green when fresh or dry, fruiting branchlets usually crooked.
7. Seed chocolate-brown, 5 mm. in length, 1, rarely 2 per berry-cone, sharply pointed tip, no pits, occasionally a very narrow longitudinal groove, smooth white hilum covering at least one-fourth the length of the seed.	7. Seed tan to chestnut-colored, 3–4 mm. in length, 3 or 4, rarely 6 to 8 per berry-cone, extremely angular, numerous deep pits, irregular light tawny hilum covering one-half to three-fourths the length of the seed.

But is *J. tetragona* Schl. var. *oligosperma* Engelm. to be placed in synonymy with *J. monticola* Mart. and what is its relation to the Texas calciphile *J. Ashei*? The specimens⁶ on which Engelmann based this variety, *Gregg 106* (June 2, 1848) and *398* (Aug. 31, 1848) collected near Saltillo, Mexico, have been

⁶ ENGELMANN, G. Trans. Acad. Sci. St. Louis 3: 591.

Plate I. Comparative Gross Morphology of Juniperus monticola and Juniperus Ashei



studied and must be referred to *J. monosperma* (Engelm.) Sarg., placing the var. *oligosperma* in synonymy with Sargent's species. A slight complication exists because of Gregg's collecting methods. The duplicate of Gregg (106) in the Gray Herbarium is a hybrid of *J. Ashei* and *J. monosperma*, showing intermediate morphology. There are at least four and probably more species of *Juniperus* growing on the foothills in the vicinity of Saltillo. Hybridization is common where juniper species grow together. Gregg most likely collected from a mixed population and gave a hybrid and fairly typical specimen of *J. monosperma* the same number later when he prepared his labels. The typical specimen of *J. monosperma* went to Engelmann and the other (the hybrid) went to Gray.

This error on the part of American authors in referring to the Texas juniper by means of the various names for the very different Mexican species is the source of the confusion. The Texas juniper is a distinct species from the Mexican one; consequently, none of the above names apply. Other names, all synonyms of *J. monticola* forma *compacta*, which have been erroneously applied to the Texas species are *J. sabinoides* (HBK) Nees (1847), *Sabina sabinoides* (HBK) Small (1903), and *J. sabinoides* (HBK) Sargent (1897). The latter combination has no status since the same combination cannot be made twice.

Engelmann⁷ described a juniper from "West Texas" as *J. occidentalis* Hook. var. *conjungens* Engelm. His description was rather sketchy but it fits *J. Ashei* better than any other southwestern species. His illustration of var. *conjungens*⁸ precisely fits the collection by Berlandier (671 = 2081) which Engelmann cites. Other collections (numbers and dates are supplied by the present author) which Engelmann cites are those of Lindheimer from the base of the Balcones Escarpment, New Braunfels, Texas, 1848 (362 and 228) Feb. 1850, May 1875, and Lindheimer (1194, 1195, 1196, 1197, 1198) from Comanche Spring and New Braunfels, Feb. 1850; Wright, New Braunfels, Texas; Bigelow, the only specimen seen in the Engelmann Herbarium, was collected in 1853 in the Valley of the Pecos, Texas, labelled *J. occidentalis* Hook. (the specimen is actually *J. monosperma* Sarg.); Hall (615 = 7741) from Austin, Texas, May 15, 1872.

⁷ ENGELMANN, G. loc. cit. p. 590.

⁸ ENGELMANN, G. loc. cit. p. 585.

While Ferdinand Lindheimer and Elihu Hall collected in Texas in the vicinity of San Antonio, Austin, and New Braunfels, Charles Wright and John M. Bigelow collected mostly in west Texas during the Mexican boundary survey. Wright's specimen from New Braunfels (undated and without number) was probably collected May 29, 1849, according to the list of localities visited by him published by Wooton.⁹ All of these specimens excluding Bigelow's are from the Balcones Escarpment in a region where hybrid swarms between *J. Ashei* and *J. virginiana* are legion. These specimens are not typical of *J. Ashei* but are probably backcrosses from hybrid material to *J. Ashei* and should be identified with the latter species. Berlandier's specimen particularly shows a few characters of *J. virginiana*, such as elongate glands on the long shoot leaves, foliage fine and dark green instead of thick and olive green, teeth on the leaf margins irregular in size and remotely spaced. Even though these specimens probably are of hybrid origin, they are so close to *J. Ashei* in morphology that I consider them to belong to that species.

Other specimens which Engelmann mentions in relation to *J. occidentalis* var. *conjungens* were a Sartorius collection from Mexico in the Torrey Herbarium and an Aschenborn (381) specimen from Zimapan, Mexico. Engelmann felt that these specimens were probably the same thing as his var. *conjungens*. I have examined these specimens, and the Sartorius collection is a specimen of *J. monticola* Mart.; the Aschenborn (381) is a specimen of *J. monosperma* (Engelm.) Sarg. He also cites a Charles Wright collection ". . . found in the damp rocky woods of the mountains of eastern Cuba a few individuals of a middle-sized tree, apparently very rare, of which only male specimens were obtained (Pl. Cub. 3187, *J. virginiana*, Griseb. Pl. Cub. 217), . . ." This specimen belongs to the species *J. lucayana* Britton.

Since the specimens on which the var. *conjungens* was based are not hybrids in the technical sense, the name *conjungens* (1877) is a valid varietal epithet for the calciphilous juniper of central Texas. However, if the view be adopted that this juniper deserves specific rank, the only available name is *J. Ashei* Buchholz (1930).

⁹ WOOTON, E. O. Bull. Torr. Bot. Club 33: 563.

The following outline will serve to summarize the nomenclatural status of *J. Ashei*.

JUNIPERUS ASHEI Buchholz, Bot. Gaz. **90**: 326–334. 1930. *Cupressus sabinoides* of authors, not of Humboldt, Bonpland & Kunth. *Juniperus mexicana* of Standley, Contr. U. S. Nat. Herb. **23**: 62; of Palmer and Steyermark, Ann. Mo. Bot. Gard. **22**: 454, 1935, of authors but not Sprengel nor Schlechtendal. *Juniperus sabinoides* of authors not Grisebach or Nees. *Juniperus sabinoides* of Sargent, Silva N. Am., **X**: 91. 1897, not *Cupressus sabinoides* HBK. *Sabina sabinoides* of Small, Fl. Southeastern U. S., **33**, 1903, not *Cupressus sabinoides* of Humboldt, Bonpland & Kunth. *Juniperus occidentalis* Hook. var. *conjungens* Engelm., Trans. Acad. Sci. St. Louis **III**: 590. 1877.

Buchholz¹⁰ described *J. Ashei* from material collected on the bluffs of the White River near Sylamore, Arkansas, but he did not clearly designate a type in his published account of it. However, there are two herbarium sheets of this species in the Herbarium of the University of North Carolina labeled as types, one labeled ♀ type and the other ♂ type specimen.

There are no special considerations in relation to the type method given to dioecious plants in the International Rules of Botanical Nomenclature. In *Juniperus* the female specimen possesses the best characters for differentiating taxa, so that specimens bearing mature berry-cones are the better material for types.

Buchholz¹¹ wrote "Material examined.—Arkansas (J. Ashei): Sylamore, W. W. Ashe, Jan. 9, 1923, Apr. 25, 1924, and Apr. 28, 1925, Sept. 16, 1923, and Mar. 6, 1924, male- and female-type specimen, in herb. W. W. Ashe (cotype material on deposit at Herb. Mo. Bot. Gard. and elsewhere)." The ♀ type specimen bears three dates one of which, Sept. 16, 1923, he cites. The ♂ type specimen bears the date Mar. 16, 1924 which may have been cited as Mar. 6, 1924. The specimen marked ♀ type is accession number 22520 of University of North Carolina Herbarium. It consists of 3 twigs collected at different dates and 2 pieces of bark all from the same tree. The twig with smaller immature fruit was collected March 28, 1924, just after fertilization had occurred; the twig with intermediate sized fruit was collected May 6, 1924; the twig with mature fruit was collected September 16, 1923; and this latter twig bearing

¹⁰ BUCHHOLZ, J. T. Bot. Gaz. **90**: 326–334. 1930.

¹¹ BUCHHOLZ, J. T. loc. cit.

the September date is hereby designated the *Lectotype*. The other two specimens on this sheet and the specimens on the sheet marked male-type are *Paratypes*. These specimens were in the W. W. Ashe Herbarium now on deposit at the Herbarium of the University of North Carolina.

Type locality is the limestone soil in the basin of the White River near Sylamore, Arkansas. This material which constitutes the nomenclatural type is not biologically typical of the species *J. Ashei* since it was derived in the vicinity of hybrid swarms between *J. Ashei* and *J. virginiana* and shows introgression from *J. virginiana*.

In his study of Mexican Junipers Martínez¹² stated that there is no juniper known to him in Mexico which could be referred to the Texas calciphile, *J. Ashei* or *J. mexicana* Spreng. sensu American authors. He referred all those specimens from Mexico so named to either *J. erythrocarpa* Cory or *J. monosperma* (Engelm.) Sarg. However, there are three collections from Mexico known to me which I refer to the Texas species, *J. Ashei*: I. M. Johnston, 9195, from Protrero de La Mula, northwest of Ocampo, Coahuila; F. Lyle Wynd and C. H. Mueller, 284, Hacienda Mariposa near Puerto Santa Ana, Coahuila, determined as *J. pachyphloea*; F. Lyle Wynd and C. H. Mueller, 360, near Puerto Santa Ana, Coahuila. None of these three specimens is typical of Ashe juniper; nevertheless, each resembles *J. Ashei* more than any other species and deserves to be considered a variant of that species. In several characters they vary toward *J. monosperma*, and I believe that they represent introgressants of *J. Ashei* by *J. monosperma*. Since taxonomists do not propose to name every hybrid variant and particularly every introgressant, these specimens should be referred to *J. Ashei* Buchholz.

Martínez annotated I. M. Johnston's specimen 9195 as *J. monosperma* (Engelm.) Sarg. and cited it as such in his revision. He had sent the specimen to John Buchholz who told Martínez that it was not *J. Ashei*, the species which Buchholz himself had named. This situation does not seem so strange when one considers the facts. Buchholz named material from the Ozarks where specimens of *J. Ashei* are really introgressants with genes

¹² MARTÍNEZ, M. loc. cit. p. 101.

of *J. virginiana* and have fine foliage, smaller fruit, more often with two seeds, and Johnston's specimen is from Coahuila where *J. Ashei* has received genes from *J. monosperma*.

The distribution of *J. Ashei* may be considered a narrow ellipse about 1,000 miles long roughly running from southwestern Missouri to central Coahuila with a northeast, southwest axis. In the northeast the species is disjunct and shows strong introgression from *J. virginiana*; in the southwest the species again occurs in isolated colonies and shows introgression from *J. monosperma* from Coahuila up the western border of the range of *J. Ashei* to the Valley of the Pecos in Texas.

The nomenclature of the Mexican species involved in this problem may also be outlined following Martínez, 1946.

JUNIPERUS MONTICOLA Martínez, *Anales Del Instituto de Biología* 17: 79, 1946, based on *Juniperus tetragona* Schl. not Moench, 1794.

J. MONTICOLA Mart. forma *COMPACTA* Mart. loc. cit. p. 85.

Cupressus sabinoides HBK., *Nova Gen. et Sp. Plant.* II: 3, 1817. *Juniperus mexicana* Spreng., *Syst. Veg.* Ed. 3: 909, 1826, based on *Cupressus sabinoides* HBK. *Juniperus sabinoides* (HBK) Nees, *Linnaea* XIX: 706, 1847, not A. H. R. Grisebach. *Spicil. Fl. Rumel.* 1844. *Sabina sabinoides* (HBK) Small, *Fl. Southeastern U. S.* 33, 1903, as to basynym only.—
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